

# Solving Equations & Inequalities Practice

Name: KEY

- Solve the following equations and inequalities.
- Graph the answer to any inequality.
- Check for extraneous solutions (no solutions).

1.  $7x + 4 - 2x = 49$

$$5x = 45$$

$$x = 9$$

3.  $7x = 3x - 80$

$$4x = -80$$

$$x = -20$$

5.  $5 + 3(x - 2) = x + x - 13$

$$5 + 3x - 6 = 2x - 13$$

$$3x - 1 = 2x - 13$$

$$x = -12$$

7.  $\frac{3}{4}\left(3x - \frac{1}{2}\right) - \frac{2}{3} = \frac{1}{3}$

$$\frac{3}{4}\left(3x - \frac{1}{2}\right) = 1$$

$$3\left(3x - \frac{1}{2}\right) = 4$$

$$9x - \frac{3}{2} = 4$$

$$18x - 3 = 8$$

$$18x = 11$$

$$x = \frac{11}{18}$$

9.  $\left(\frac{2}{3} + 3y = 5y - \frac{2}{15}\right) 15$

$$10 + 45y = 75y - 2$$

$$12 = 30y$$

$$y = \frac{2}{5}$$

11.  $-4x > 1$

$$x < -\frac{1}{4}$$


13.  $\frac{2}{3}x - 4 < 14$

$$\left(\frac{2}{3}x < 18\right) 3$$

$$2x < 54$$

$$x < 27$$


15.  $5(x + 3) - 2x \geq -21$

$$5x + 15 - 2x \geq -21$$

$$3x \geq -36$$

$$x \geq -12$$



2.  $31 = 5 - 2(3x + 4) - x$

$$31 = 5 - 6x - 8 - x$$

$$31 = -3 - 7x$$

$$34 = -7x$$

$$x = -\frac{34}{7}$$

4.  $2(4c - 7) = 8c + 14$

$$8c - 14 = 8c + 14$$

$$-14 = 14$$

No solution

6.  $\left(\frac{2}{3}(2x - 1) = 10\right) 3$

$$2(2x - 1) = 30$$

$$4x - 2 = 30$$

$$4x = 32$$

$$x = 8$$

8.  $\left(\frac{5}{3} + \frac{2}{3}x = \frac{25}{12} + \frac{5}{4}x + \frac{3}{4}\right) 12$

$$20 + 8x = 25 + 15x + 9$$

$$20 + 8x = 34 + 15x$$

$$-14 = 7x$$

$$x = -2$$

10.  $\left(\frac{2}{3}x < 6\right) 3$

$$2x < 18$$

$$x < 9$$


12.  $13 - 4x < 25$

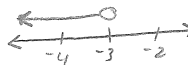
$$-4x < 12$$

$$x > -3$$


14.  $-5x + 17 - 8x > 56$

$$-13x + 17 > 56$$

$$-13x > 39$$

$$x < -3$$


16.  $2(x + 3) - 5(x - 1) > 32$

$$2x + 6 - 5x + 5 > 32$$

$$-3x + 11 > 32$$

$$-3x > 21$$


$$x < -7$$




$$17. 4x \leq 37 + 4x$$

$$\begin{array}{r} -4x \quad -4x \\ 0 \leq 37 \end{array} \quad \text{All Real \#s}$$


$$19. 4 - 5x > -13 \text{ or } 3 - x \leq 10$$

$$\begin{array}{r} -5x > -17 \quad \text{or} \quad -x \leq 7 \\ x < \frac{17}{5} \quad \text{or} \quad x \geq -7 \end{array}$$


$$21. 15 < 6 - 10x \leq 37$$

$$\begin{array}{r} 9 < -10x \leq 31 \\ -\frac{9}{10} > x \geq -\frac{31}{10} \end{array}$$


$$23. |x+3| = 19$$

$$\begin{array}{l} x+3=19 \quad \text{or} \quad x+3=-19 \\ x=16 \quad \text{or} \quad x=-22 \end{array}$$

$$25. |x| - 9 = 21$$

$$\begin{array}{l} |x| = 30 \\ x=30 \quad \text{or} \quad x=-30 \end{array}$$

$$27. 4 - |x-1| = -5$$

$$\begin{array}{l} -|x-1| = -9 \\ |x-1| = 9 \\ x-1=9 \quad \text{or} \quad x-1=-9 \\ x=10 \quad \text{or} \quad x=-8 \end{array}$$


$$29. |x-3| > 8$$

$$\begin{array}{l} x-3 > 8 \quad \text{or} \quad x-3 < -8 \\ x > 11 \quad \text{or} \quad x < -5 \end{array}$$


$$31. |7x+5| < -8$$

An absolute value can't be less than a negative #.  
No solution.


$$33. 3|x+8| > 42$$

$$\begin{array}{l} |x+8| > 14 \\ x+8 > 14 \quad \text{or} \quad x+8 < -14 \\ x > 6 \quad \text{or} \quad x < -22 \end{array}$$


$$35. 5x + t = 17 \quad x$$

$$\begin{array}{r} 5x = 17 - t \\ x = \frac{17-t}{5} \end{array}$$


$$18. 5(9-x) \leq 4(x+18)$$

$$\begin{array}{r} 45 - 5x \leq 4x + 72 \\ 45 \leq 9x + 72 \\ -27 \leq 9x \quad x \geq -3 \end{array}$$


$$20. -3 \leq 2x + 11 \leq 9$$

$$\begin{array}{r} -14 \leq 2x \leq -2 \\ -7 \leq x \leq -1 \end{array}$$


$$22. 3x - 4 \geq 17 \text{ or } 4x + 7 \leq 19$$

$$\begin{array}{r} 3x \geq 21 \quad \text{or} \quad 4x \leq 12 \\ x \geq 7 \quad \text{or} \quad x \leq 3 \end{array}$$


$$24. |5-x| = 31$$

$$\begin{array}{l} 5-x=31 \quad \text{or} \quad 5-x=-31 \\ -x=26 \quad \text{or} \quad -x=-36 \\ x=-26 \quad \text{or} \quad x=36 \end{array}$$


$$26. |2x+3| - 5 = 17$$

$$\begin{array}{l} |2x+3| = 22 \\ 2x+3=22 \quad \text{or} \quad 2x+3=-22 \\ 2x=19 \quad \text{or} \quad 2x=-25 \\ x=\frac{19}{2} \quad \text{or} \quad x=-\frac{25}{2} \end{array}$$


$$28. 2|2x-6| + 5 = 19$$

$$\begin{array}{l} 2|2x-6| = 14 \\ |2x-6| = 7 \\ 2x-6=7 \quad \text{or} \quad 2x-6=-7 \\ x=\frac{13}{2} \quad \text{or} \quad x=-\frac{1}{2} \end{array}$$

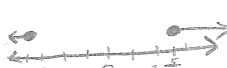
$$30. |2x+15| < 11$$

$$\begin{array}{l} -11 < 2x+15 < 11 \\ -26 < 2x < -4 \\ -13 < x < -2 \end{array}$$


$$32. 5 + |x+4| \geq 16$$

$$\begin{array}{l} |x+4| \geq 11 \\ x+4 \geq 11 \quad \text{or} \quad x+4 \leq -11 \\ x \geq 7 \quad \text{or} \quad x \leq -15 \end{array}$$


$$34. 9 - |2x+1| \leq 3$$

$$\begin{array}{l} -|2x+1| \leq -6 \\ |2x+1| \geq 6 \\ 2x+1 \geq 6 \quad \text{or} \quad 2x+1 \leq -6 \\ x \geq \frac{5}{2} \quad \text{or} \quad x \leq -\frac{7}{2} \end{array}$$


$$36. 2x = 4a + 2b \quad a$$

$$\begin{array}{r} 2x - 2b = 4a \\ x - b = 2a \\ x = \frac{2a+b}{2} \end{array}$$

$$37. \frac{21w}{x} = 3x$$

$$\frac{21w}{x} = \frac{3x}{1}$$

$$21w = 3x$$

$$7w = x$$

$$39. x + 3v = 9v$$

$$x = 6v$$

$$v = \frac{x}{6}$$

$$41. A = \frac{1}{2}ah - \frac{1}{2}bh$$

$$2A = ah - bh$$

$$2A - ah = -bh$$

$$\frac{2A - ah}{-h} = \frac{-bh}{-h}$$

$$\frac{2A - ah}{-h} = b$$

$$43. \sqrt{x} + 9 = 25$$

$$(\sqrt{x})^2 = (16)^2$$

$$x = 256$$

$$45. \sqrt{x-5} + 3 = 10$$

$$(\sqrt{x-5})^2 = (7)^2$$

$$x-5 = 49$$

$$x = 54$$

$$47. \sqrt{x+2} + 12 = 7$$

$$\sqrt{x+2} = -5$$

No solution

Solve using any method but make sure you understand each method.

$$49. \begin{cases} 3x - y = 5 \\ 2x + y = 15 \end{cases}$$

$$\begin{array}{r} 3x - y = 5 \\ 2x + y = 15 \\ \hline 5x = 20 \\ x = 4 \end{array}$$

$$\begin{array}{r} 3(4) - y = 5 \\ 12 - y = 5 \\ 7 = y \end{array}$$

$$(4, 7)$$

$$51. \begin{cases} 5x - y = 22 \\ 5x + 4y = -63 \end{cases}$$

$$\begin{array}{r} 5x - y = 22 \\ 5x + 4y = -63 \\ \hline -5y = 85 \\ y = -17 \end{array}$$

$$5x - (-17) = 22$$

$$5x + 17 = 22$$

$$5x = 5$$

$$x = 1$$

$$(1, -17)$$

$$53. \begin{cases} 3x - 5y = -29 \\ 2x - 10y = -42 \end{cases}$$

$$\begin{array}{r} 3x - 5y = -29 \\ 2x - 10y = -42 \\ \hline -x + 5y = 13 \\ x = 5y - 13 \end{array}$$

$$3(5y - 13) - 5y = -29$$

$$15y - 39 - 5y = -29$$

$$10y - 39 = -29$$

$$10y = 10$$

$$y = 1$$

$$x = 5(1) - 13 = -8$$

$$(-8, 1)$$

$$38. pcx = 2p + 7$$

$$p(cx - 2) = 7$$

$$p = \frac{7}{cx - 2}$$

$$40. ax - b = k$$

$$-b = k - ax$$

$$b = ax - k$$

$$42. Q = 3a + 5ca$$

$$Q = a(3 + 5c)$$

$$\frac{Q}{3 + 5c} = a$$

$$44. \sqrt{3x+4} = 5$$

$$3x+4 = 25$$

$$3x = 21$$

$$x = 7$$

$$46. 13 - \sqrt{x-1} = 22$$

$$-\sqrt{x-1} = 9$$

$$(\sqrt{x-1})^2 = (9)^2$$

$$x-1 = 81$$

$$x = 82$$

Extraneous

No solution

$$48. 5 - \sqrt{x} = 2$$

$$-\sqrt{x} = -3$$

$$(\sqrt{x})^2 = (3)^2$$

$$x = 9$$

$$50. \begin{cases} 3x + 5y = 17 \\ 2x + 3y = 11 \end{cases}$$

$$\begin{array}{r} 3x + 5y = 17 \\ 2x + 3y = 11 \\ \hline -x + 2y = 6 \\ x = 2y - 6 \end{array}$$

$$3(2y - 6) + 5y = 17$$

$$6y - 18 + 5y = 17$$

$$11y - 18 = 17$$

$$11y = 35$$

$$y = \frac{35}{11}$$

$$x = 2(\frac{35}{11}) - 6 = \frac{70}{11} - \frac{66}{11} = \frac{4}{11}$$

$$(\frac{4}{11}, \frac{35}{11})$$

$$52. \begin{cases} 4x - 5y = -19 \\ 3x + 7y = 18 \end{cases}$$

$$\begin{array}{r} 4x - 5y = -19 \\ 3x + 7y = 18 \\ \hline -x + 12y = -37 \\ x = 12y + 37 \end{array}$$

$$3(12y + 37) + 7y = 18$$

$$36y + 111 + 7y = 18$$

$$43y + 111 = 18$$

$$43y = -93$$

$$y = -\frac{93}{43}$$

$$x = 12(-\frac{93}{43}) + 37 = -\frac{1116}{43} + \frac{1551}{43} = \frac{435}{43}$$

$$(\frac{435}{43}, -\frac{93}{43})$$

$$54. \begin{cases} 4x + y = 42 \\ 6x - 5y = 50 \end{cases}$$

$$y = 42 - 4x$$

$$6x - 5(42 - 4x) = 50$$

$$6x - 210 + 20x = 50$$

$$26x - 210 = 50$$

$$26x = 260$$

$$x = 10$$

$$y = 42 - 4(10) = 2$$

$$(10, 2)$$

55. The difference of two numbers is 12. One fourth of the larger number plus on half the smaller number is 9. Find the numbers.

$x = \text{first \#}$   
 $y = \text{second \#}$

$$\begin{aligned} (x - y) &= 12 \\ \frac{1}{4}x + \frac{1}{2}y &= 9 \end{aligned}$$

$$\begin{aligned} \frac{1}{2}x - \frac{1}{2}y &= 6 \\ \frac{1}{4}x + \frac{1}{2}y &= 9 \\ \hline \frac{3}{4}x &= 15 \quad x = 20 \end{aligned}$$

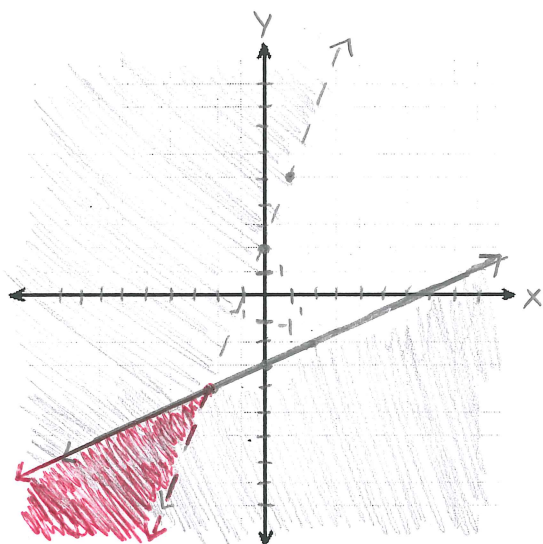
$$\begin{aligned} (20) - y &= 12 \\ -y &= -8 \\ y &= 8 \end{aligned}$$

56. A motorboat traveled for 2 hours with an 8 km/h current. The return trip against the same current took 3 hours. Find the speed of the motorboat in still water.

$m = \text{speed of motorboat}$   
 $t = \text{trip in kilometers}$

$$\begin{aligned} m + 8 &= \frac{t}{2} \rightarrow 2m + 16 = t & 2m + 16 &= 3m - 24 \\ m - 8 &= \frac{t}{3} \rightarrow 3m - 24 = t & 40 &= m \\ & & 40 \text{ km/h} & \end{aligned}$$

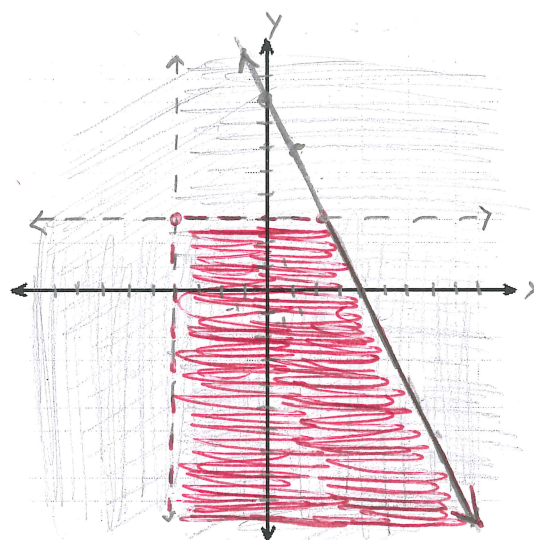
57. Graph:  $y > 3x + 2$   
 $y \leq \frac{1}{2}x - 3$



- a)  $y = 3x + 2$   
 Dashed  
 Test:  $(0,0)$   
 $0 > 3(0) + 2$   
 $0 > 2$   
 X  
 Shade other side

- b)  $y = \frac{1}{2}x - 3$   
 Solid  
 Test:  $(2,2)$   
 $2 \leq \frac{1}{2}(2) - 3$   
 $2 \leq 1 - 3$   
 $2 \leq -2$   
 X  
 Shade other side

58. Graph:  $x > -4$   
 $y \leq -2x + 8$



- a)  $x = -4$   
 Dashed  
 Test  $(3,5)$   
 $3 > -4$   
 ✓  
 Shade same side

- b)  $y = 3$   
 Dashed  
 Test:  $(-5,-3)$   
 $-3 < 3$   
 ✓  
 Shade same side

- c)  $y = -2x + 8$   
 Solid  
 Test:  $(0,0)$   
 $0 \leq -2(0) + 8$   
 $0 \leq 8$   
 ✓  
 Shade same side